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HEAT TREATING DEVICE OF SAND MOLD CASTING

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ABSTRACT

PURPOSE: To accelerate effectively collapsion of molding sand from a casting by providing a zone for accelerating the collapsion of the molding sand between a heating furnace and a cooler and maintaining said zone at the high temperature atmosphere of the oxygen concentration higher than the oxygen concentration in the heating furnace.

CONSTITUTION: A casting product P is conveyed successively from a preheating furnace 1 to a heating furnace 2, a device 3 for accelerating collapsion of molding sand and a cooler 4. The product is heat treated continuously by a burner 6 and a turbo fan 7 in the furnace 2 and the devic 3. The atmosphere of the oxygen concentration higher than the oxygen concentration of the atmosphere in the furnace 2 is provided by a heat exchanger 12 to the device 3. More specifically, the heat exchanger 12 feeds fresh air containing about 21% oxygen through an air feed duct 15 by a fan 14 into the device 3, sucks the air in the device 3 through a duct 13 and discharges the same from a duct 16 after heat exchange with the feed air. The oxidation decomposition of the binder for the molding sand is thus accelerated and the molding sand is easily dislodged from the product P.

(2) Japanese laid open patent application 59-219410

1. Title of the invention

Heat treating device of sand mold casting

2. Claims

A heat treating device of a sand mold casting comprising a heating furnace for heat treatment of the casting, which is conveyed from a molding device, by combustion in an atmosphere substantially sealed from an outer air, and a cooling device for quenching in water or oil the product conveyed out from the heating furnace, the heat treating device being characterized by a zone for accelerating collapsion of molding sand, which zone is provided on the convey path of the casting between the heating furnace and the cooling device, and which zone provides a high temperature atmosphere with higher concentration of oxygen than that in the heating furnace.

3. Detailed description of the invention

The present invention relates to a heat treating device of a sand mold casting, and particulary to a heat treating device of a direct combustion heating type which uses for heating combustion by, such as a burner.

In general, a casting, which is molded in a sand mold and conveyed from a molding device, is subject to a heat treatment of heating and cooling so as to improve the steel structure. Core sand and molding sand stuck to the casting surface are removed, and then the casting is sent to a washing process.

For example, in a case of an aluminium die casting which is suitable for molding a product having a complicated figure, the casting is heated to about 500°C, and then heat treated of quenching in water or oil. During those processes, the molding sand is collapsed and fallen down from the casting.

However, in a case of a casting having a complicated internal figure, core sand and the like can not be totally removed during the heating and brought to the cooling process. Accordingly, an additional removing means is required.

Herein, in a case of a direct combustion heating method which uses combustion flame from a burner and so on for the heat treating, the inside of the heating furnace is rigidly sealed in order for adequate maintenance of the heating atmosphere and effective use of heat energy, and the air taken from outside is minimized, being held to the amount necessary for combustion by the burner.

Thereby, the oxygen concentration in the atmosphere within the heating furnace lowers down by combustion by the burner from the normal state of about 21% to about 5-10%.

The high temperature air functions as, other than effecting the aimed heating treatment, accelerating oxidization decomposition of a high molecular binder binding the molding sand, and collapsing the molding sand. If the oxygen concentration within the furnace decreases, the collapsion of the molding sand is disturbed, and the casting is brought to the following cooling process together with a large amount of the molding sand stuck thereto. Accordingly, it is necessary to provide a stirring device or a sand extracting pump and the like in the cooling tank, so as to remove and discharge the molding sand by, such as a stirring effect in the water current.

Moreover, as the removed sand is usually collected and reused, additional efforts and time are required to separate it from water or oil, or to dry it, etc.

An object of the present invention is to solve those drawbacks of the prior art, and provide a heat treating device for a sand mold casting which is of a direct combustion heating type and effectively accelerates collapsion of molding sand from the casting.

In order to achieve this object, the present invention provides a heat treating device of a sand mold casting comprising a heating furnace for heat treatment of the casting, which is conveyed from a molding device, by combustion in an atmosphere substantially sealed from an outer air, and a cooling device for quenching in water or oil the product conveyed out from the heating furnace, the heat treating device being characterized by a zone for accelerating collapsion of molding sand, which zone is provided on the convey path of the casting between the heating furnace and the cooling device, and which zone provides a high temperature atmosphere with higher concentration of oxygen than that in the heating furnace.

Hereafter, the present invention will be described in detail based on the embodiment shown in the drawings.

Figure 1 is a schematic plan view of a continuing heat treating apparatus of aluminium die casting products in accordance with an embodiment of the present invention. The aluminum casting product (hereafter, the product) brought out from a casting device (not shown) is conveyed successively from preheating furnace 1 to heating furnace 2, accelerating device 3 for accelerating collapsion of the molding sand and a cooling device 4, and in the meantime is subjected to the continuing heat treatment.

Preheating furnace 1 is a zone for, in advance of the heating treatment, uniformly preheating each part of product P which is taken out from a molding device, by using the discharged air of high temperature from heating furnace 2 or accelerating device 3, so as to enhance heat effects to product P within heating furnace 2 and to save energy. The preheating furnace has an endless chain (not shown) for conveying product P along the direction of arrow A during the preheating.

Heating furnace 2 is perpendicularly provided to the exit end of preheating furnace 1. It is a zone for heating product P to a predetermined heating temperature for a predetermined time duration. It has a plurality of path rollers to convey product P in a direction of arrow B during the heat treatment.

In addition, as shown in Figure 2 which is a cross sectional view, heating furnace 2 is sealed with casing 5 having a double wall structure with a heat insulator provided therebetween. The above of casing 5, burners 6 and turbo fans 7 are provided at opposite sides at a predetermined interval along the convey direction B. The atmosphere within the furnace is heated to the heating temperature by a direct combustion heating method, and at the same time, moved by turbo fans 7 driven by fan motors 8 through duct 9 and around product P, and then discharged to the outside of the furnace as a high temperature discharged air. The discharged air is introduced into preheating furnace 1, and used as a preheating source of product P within preheating furnace 1.

Underneath of casing 5, provided is screw conveyer 10 for conveying out the molding sand collapsed from product P which is conveyed within the furnace. Collecting basket 11 is provided at on a discharging end of the conveyer.

Herein, the aforementioned casing 5, screw conveyer 10, etc. are also provided in the above mentioned preheating furnace 1 and accelerating device 3 which will be described below.

Accelerating device 3 for accelerating collapsion of molding sand is, as shown in Figure 1, provided between a terminal end of a product path of heating furnace 2 and cooling device 4 which will be described below. The device is used for providing the product with a high temperature atmosphere of the oxygen concentration higher than that in heating furnace 2 (e.g. oxygen concentration of normal fresh air of 21%), so as to accelerate oxidation decomposition of a binder for the molding sand.

That is, as shown in Figures 3 and 4, accelerating device 3 is provided with heat exchanger 12 for heating and introducing fresh air.

Heat exchanger 12 is an entire heat exchanger which forcibly exchanges the heat between the fresh air directly introduced therein and having the oxygen concentration of 21%, and high temperature discharged air which is introduced therein via discharging duct 13 having an opening in duct 9 of accelerating device 3. The fresh air, which is heated to a high temperature by the heat exchange with the high temperature discharged air provided via duct 13, is introduced by fan 14 via air intake duct 15 whose opening is located in accelerating device 3.

Herein, 16 is a discharging duct discharging the discharged air of the heat exchanger.

Cooling device 4 is a zone provided adjacent to accelerating device 3 and for quenching the product provided from accelerating device 3. It comprises product shelf 18 which is cylinder driven for sinking product P in and out of water tank 17 within the pit, pump 19 for stirring water in water tank 17, and sand extracting pump 20 for discharging molding sand fallen from product P together with water.

Herein, preheating furnace 1, heating furnace 2, and accelerating device 3 are separated each other by partition doors 22 which are opened and closed by cylinders

21 and which are provided to seal each treating zone so as to maintain the desired atmosphere therein. In addition, such a partition door 22 is also provided at the entrance of preheating furnace 1 and at the exit of accelerating device 3.

In the present device comprising with the above mentioned components, aluminium die casting product P which is to be heat treated is conveyed into preheating furnace 1, and conveyed in the direction of arrow A by the endless chain, so as to be uniformly preheated to a relatively low predetermined temperature (e.g. about 100°C) by using a part of the heat discharged from heating furnace 2.

Next, preheated product P is conveyed via partition door 22 opened by activation of cylinder 2 into heating furnace 2 on the path rollers (not shown) in the direction of arrow B, being heated with the heat from burner 6 to a predetermined heat treatment temperature (e.g. about 510°C), and heat treated in this temperature for a predetermined period (e.g. 240 minutes).

The heating air is effectively and uniformly disbursed by turbo fan 7 provided in the furnace, and discharged to the outside of the furnace after heating product P. The discharged air of high temperature is then introduced into preheating furnace 1 and used as a preheating source.

Herein, the core sand coupled to the interior of product P and the molding sand stuck on the surface thereof are collapsed down from product P as the binder binding them is oxidized during the heat treatment and decomposed by the heat. The sand is discharged by screw conveyer 10 underneath of casing 5, and collected in basket 11.

However, since entrance of outer air is minimized to just enough for combustion by burner 6 in order to improve heat efficiency within heating furnace 2, the oxygen concentration gradually goes down from the normal value of about 21 % to about 5-10 % during the heat treatment. If such a condition is settled, the oxidation decomposition can not be adequately carried out, and the molding sand is hardly collapsed from the surface of the product.

Accordingly, by the present device, in the following accelerating device 3 for accelerating collapsion of the molding sand, high temperature fresh air is introduced which has a high oxygen concentration.

That is, in accelerating device 3 for accelerating collapsion of the molding sand in which heat treated device P is conveyed, fresh air is heated in heat exchanger 12 through heat exchanges with discharged high temperature air fed via duct 13, and then discharged into the accelerating device via supply duct 15, resulting in an increase of oxygen concentration in the atmosphere within accelerating device 3 to about 15-20%. That accelerates oxidation decomposition of the binder for the molding sand, and the molding sand collapse and falls down easily from product P. The fallen molding sand is conveyed out and retrieved by screw conveyer 10 of the same type of ones in heating furnace 2.

Then, product P is conveyed to cooling device 4, cooling treated in water tank 17, and then conveyed to the following washing device, etc.

Herein, product P conveyed to cooling device 4 has some molding sand stuck thereto. The molding sand falls by a stir of water flow by pump 19 during immersion into water tank 17, and is discharged with water by sand extracting pump 20 to a device for collecting the molding sand (not shown).

As described above, in the embodiment of the present invention, the accelerating device 3 is provided between heating furnace 2 using a direct combustion heating method with burner 6 and the following cooling device 4. As accelerating device 3 introduces fresh air and provides a high temperature atmosphere of high oxygen concentration, molding sand, which is hardly collapsible from product P due to low oxygen concentration in heating furnace 2 during heating treatment, is brought into contact with the high temperature fresh air of high oxygen concentration, so that oxidation decomposition of the binder for the mold sand is enhanced and collapsion of the molding sand is accelerated.

Consequently, there are advantages that most molding sand stuck on product P is collapsed while passing through accelerating device 3, and that the load of sand extracting pump 20 of the following cooling device 4 and the efforts and costs to collect and reuse molding sand collected with water are significantly diminished.

Moreover, the provision of accelerating device 3 at the exit end of heating furnace 2 provides an effect of diminishing disturbance in the atmosphere, such as

decrease in the temperature of the furnace by contacting with fresh air of a low temperature, when partition door 22 at the exit end of heating furnace 2 is opened.

Furthermore, the aforementioned atmosphere of high oxygen concentration can be adequately obtained by merely introducing fresh air. No special source for supplying oxygen is required. Heating the fresh air is efficiently done by an exchange of heat with the discharged air of high temperature from the accelerating device 3.

Furthermore, the discharged air after the heat exchanged can be provided through discharging duct 16 to preheating furnace 1 and used as a preheat source. It may be used for drying the molding sand containing water which collected by sand extracting pump 20 of cooling device 4. As a whole apparatus, it is possible to use heat extremely efficiently.

Herein, in the above described embodiment, a partition door 22 is provided in a rear section within the furnace 2 itself, and the section between partition door 22 and the outlet is used as a section for accelerating collapsion of the molding sand. A device 3 for accelerating collapsion of the molding sand may of course be provided as an independent section between heating furnace 2 and cooling device 4.

Moreover, heated product P is quenched in water of water tank 17. As a coolant, conventional quench oil may be used instead of water as required.

Furthermore, the embodiment is suitable for castings having complicated figures. The preferred embodiment has been described for the heat treatment of aluminium die casting products in which a problem of separation from molding sand is often arose. The device in accordance with the present invention may be used for heat treatment of any castings in general which are molded using sand molds, and provides the excellent effects.

As described above, in accordance with the present invention, during the heat treatment of casting products using sand molds, molding sand can easily be collapsed from the products.

4. Brief description of the drawings

Figure 1 is a plan view schematically showing an embodiment in accordance with the present invention.

Figure 2 is a cross-sectional view of the embodiment, Figure 3 is a plan view showing an important part of the embodiment, Figure 4 is a cross-sectional view of the part.

Description of reference numerals

1: a preheating furnace, 2: a heating furnace, 3: an accelerating device for accelerating collapsion of molding sand, 4: a cooling device, 5: a casing, 6: a burner, 7: a turbo fan, 8: a fan motor, 10: a screw conveyer, 12: a heat exchanger, 15: an air intake duct, P: aluminium die casting product.

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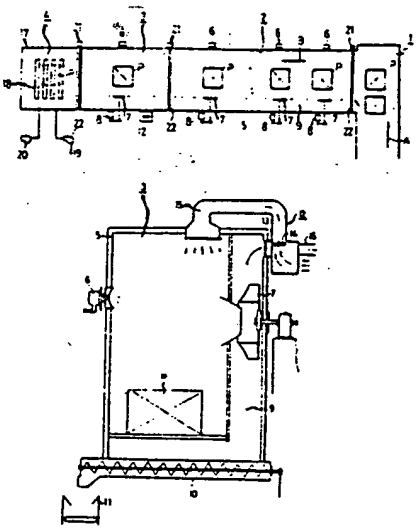

Protest Prior Art

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⑤4砂型鋳造品の熱処理装置

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明 細 書

1.発明の名称

砂型鋳造品の熱処理装置

2.特許請求の範囲

鋳造設備から搬入される砂型鋳造品を外気から略遮断された雰囲気内での燃焼によって加熱処理するようになされた加熱炉と前記加熱炉から搬出される製品を水中又は油液中で急冷するようになされた冷却装置とを備えた砂型鋳造品の熱処理装置において、前記加熱炉と冷却装置との間の鋳造品搬送路に少なくとも前記加熱炉内部よりも酸素濃度の高い高温の雰囲気を与える鋳砂崩落促進帯域を設けたことを特徴とする砂型鋳造品の熱処理装置。

3.発明の詳細な説明

本発明は砂型鋳造品の熱処理装置に係り、特に加熱のためにバーナ等の燃焼を用いる直火加熱方式の熱処理装置に関する。

鋳造設備から搬出される砂型による鋳造品に一般に鋳造組織の改質等のために加熱及び冷却等の熱処理に付され且つ中子砂や鋳造品表面に付着した鋳砂等を除去された後に洗浄工程に送られる。

例えば、複雑な形状の製品の鋳造に適したアルミダイカスト等の場合では鋳造品を約500℃程度の温度に加熱した後、これを水中又は油液中で急冷する熱処理にかけると共に、この間に鋳砂を鋳造品から崩壊・脱落させる。

しかし、内部に複雑な構造を有する鋳造品の場合には、中子砂等がこの加熱の間には完全に除去されずに冷却工程まで持ち越されるので更に付加的な除去手段を設ける必要がある。

ここで、加熱処理にバーナ等の燃焼炎を用いる直火加熱方式の場合には、加熱雰囲気の適性な維持に加えて熱エネルギーを極力有効に利用するために加熱炉の内部が厳重に遮蔽され、外部から採り入れる空気もバーナの燃焼に必要な最小限度に抑えられる。

このため、加熱炉内部の雰囲気の酸素濃度はバーナの燃焼によって通常の約21%の状態から次第に減少し約5～10%程度にまで低下する。

高温の空気は本来の熱処理効果のほかに鋳砂を結合している高分子結合剤等を酸化分解して鋳砂の崩壊・脱落を促す役割をも果たしているので、炉中の雰囲気中の酸素濃度がこのように低下すると鋳砂の崩落が妨げられ、鋳造品が多量の鋳砂を付着したまま次の冷却工程に移行することとなる。このため、例えば冷却槽に撹拌装置や揚砂ポンプ等を設けて水流の撹拌作用によって鋳砂を除去して排出する必要がある。

而も、通常は除去された鋳砂は回収して再度使用されることとされるから、水分又は油分の分離除去や乾燥等のための労力、時間が更に必要となる。

そこで本発明の目的は、かかる従来技術の欠点を解消し、特に加熱炉内部での熱処理のために直火加熱方式が用いられる際の鋳造品からの鋳砂の崩落を効果的に促進することのできる砂型鋳造品の熱処理装置を提供することにある。

この目的を達成するために本発明は、鋳造設備から搬入される砂型鋳造品を外気から略遮断された雰囲気内での燃焼によって加熱処理するようになされた加熱炉と前記加熱炉から搬出される製品を水中又は油液中で急冷するようになされた冷却装置とを備えた砂型鋳造品の熱処理装置において、前記加熱炉と冷却装置との間の鋳造品搬送路に少なくとも前記加熱炉内部よりも酸素濃度の高い高温の雰囲気を与える鋳砂崩落促進帯域を設けたことを特徴とする。

以下、本発明を図面に示す実施例に基づいて詳細に説明する。

第１図は本発明装置の一例としてアルミダイカスト製品のための連続熱処理装置の概要を示す平面図であり、鋳造設備（図示せず）から取り出されたアルミダイカスト製品（以下単に製品という）Ｐは予熱炉１－加熱炉２－鋳砂崩落促進装置３－冷却装置４を経て順次搬送され、この間に連続的な熱処理を施されるように成されている。

予熱炉１は加熱炉２内における製品Ｐの加熱効率を高め且つ省エネルギー化を図るために加熱炉２又は鋳砂崩落促進装置３から排出される高温の排気を有効利用して鋳造設備から取り出された製品Ｐの各部を加熱処理に先立って均一に予熱するための帯域であり、予熱中に製品Ｐを矢印Ａ方向に沿って搬送するためのエンドレスチェイン（図示せず）を備えている。

加熱炉２は予熱炉１の搬出側端部に直角方向に設けられており、予熱された製品Ｐを所定の加熱温度にまで昇温し、その温度で所定時間に亘って加熱する帯域であって、加熱処理中に製品Ｐを矢印Ｂ方向に沿って搬送するための多数のパスローラを備えている。

また、加熱炉２は第２図の断面図に示す如く、断熱材を介在させた二重壁構造のケーシング５によって密閉され、該ケーシング５の上部には前記搬送方向Ｂに沿って所定間隔でバーナ６及びターボファン７が対向して配設されており、炉内雰囲気を直火加熱方式で前記加熱温度に加熱すると共にファンモータ８によって回転駆動されるターボファン７によりダクト９及び製品Ｐの周囲を通して高温の排気を炉外に排出し、排出された排気は予熱炉１に導入されて予熱炉１内における製品Ｐの予熱源として利用するように成されている。

ケーシング５の下方には炉内を搬送される製品Ｐから崩落する鋳砂を排出するためのスクリューコンベア１０が配設されそのコンベア排出端部には回収バケット１１が付設されている。

なお、前記ケーシング５乃至スクリューコンベア１０等は、前述の予熱炉１及び後述する鋳砂崩落促進装置３にもそれぞれ同様に設けられている。

鋳砂崩落促進装置３は第１図に示すように加熱炉２の製品通路の排出端部と後述する冷却装置４との間に配設され、加熱炉２内の雰囲気よりも酸素濃度の高い高温の雰囲気（例えば、酸素濃度21％の通常の外気組成）を製品に与えて鋳砂結合剤の酸化分解を促進させるためのものである。

即ち、鋳砂崩落促進装置３には第３図及び第４図に示す如く、新鮮な外気を加熱して導入する熱交換器１２が配設されている。

熱交換器１２は、その内部に直接取り入れられ

る酸素濃度２１％の新鮮な外気と、鋳砂崩落促進装置３内のダクト９内に開口された排気ダクト１３を介して送給されて取り入れられる高温の排気との間で強制的に熱交換を行う全熱交換器が用いられており、ダクト１３により送給される高温の排気との熱交換により高温に加熱された外気は、ファン１４によって吹出口が鋳砂崩落促進装置３内に開口された給気ダクト１５を介して導入される。

なお、１６は熱交換後の排気を外部に排出する排気ダクトである。

冷却装置４は鋳砂崩落促進装置３からの製品を急冷するために隣接して設けられた容器であり、ピット内の水槽１７に対して製品Ｐを出没させるためのシリンダ駆動される製品棚１８、水槽１７中の水を攪拌するポンプ１９、製品Ｐから崩落した鋳砂を水と共に排出する揚砂ポンプ２０とを備えている。

なお、予熱炉１、加熱炉２及び鋳砂崩落促進装置３の相互間はそれぞれ処理雰囲気中の雰囲気が所望の状態に適確に保持されるようにシリンダ２１によって開閉可能な仕切ドア２２により互いに遮断されている。また、このような仕切ドア２２は予熱炉１の搬入口及び鋳砂崩落促進装置３の搬出口にもそれぞれ配設されている。

以上の構成からなる本発明装置においては、熱処理されるアルミダイカスト製品Ｐがまず予熱炉１に搬入され、エンドレスチェインによって矢印Ａ方向に搬送され、ここで加熱炉２の排気による熱の一部を利用して比較的低い所定温度（例えば約１００℃程度）で均一に予熱される。

次いで、予熱処理を終えた製品Ｐはシリンダ２１の駆動による仕切ドア２２の開放によって加熱炉２内に搬入され、パスローラ（図示せず）上を矢印Ｂ方向に搬送されながらバーナ６の加熱によって所定の熱処理温度（例えば約５１０℃程度）に昇温され、この温度で所定時間（例えば約２４０分程度）に亘って加熱処理される。

加熱用の空気は炉内に設置されたターボファン７によって効果的に均一な分布形態をとり製品Ｐを加熱してから炉外に排出され、排出された高温の排気はその後予熱炉１に導入されて予熱源として利用される。

ここで、製品Ｐの内部に結合した中子砂及び表面に付着した鋳砂はそれらを結合している結合剤が加熱処理中の酸化、加熱によって分解することにより崩壊して製品Ｐから脱落し、ケーシング５下方のスクリューコンベア１６により排出されバケット１１に回収される。

しかし、加熱炉２内では熱効率を良くするために外気の導入を極力抑えバーナ６の燃焼に必要な程度に抑制してあるから、熱処理中に酸素濃度が次第に低下し通常の約２１％の状態から約５～１０％程度に迄減少する。そしてこのような状態になると結合剤の酸化分解が充分に行われず、鋳砂が製品面から崩落し難くくなる。

このため本発明装置においては、次工程の鋳砂崩落促進装置３において酸素濃度の高い高温の新鮮な外気が導入される。

即ち、加熱処理後の製品Ｐが搬入される鋳砂崩落促進装置３では、熱交換器１２において新鮮な外気がダクト１３を介して送給される高温の排気との熱交換によって加温された後ファン１４によって給気ダクト１５から導入され、該装置３内の雰囲気の酸素濃度が約１５～２０％程度に増大される。これにより鋳砂結合剤の酸化分解が促進され、鋳砂が崩壊して製品Ｐから容易に脱落するようになる。そして崩落した鋳砂は加熱炉２の場合と同様なスクリューコンベア１０によって排出されて回収される。

その後、製品Ｐは冷却装置４に搬入されて水槽１７中で冷却処理され、次に後段の洗浄装置等に搬出されて行く。

なお、冷却装置４に搬入される製品Ｐには僅分かの鋳砂が付着しているが、これらは水槽１７中に浸漬された際にポンプ１９による水流攪拌により水中に脱落し、揚砂ポンプ２０によって水と共に排出されて鋳砂回収装置（図示せず）に送られる。

以上のように本発明実施例においては、バーナ

6による直火加熱方式を用いた加熱炉2とその後段の冷却装置4との間に新鮮な外気を導入して酸素濃度の高い高温の雰囲気を与える鋳砂崩壊促進装置3を設けてあるので、加熱炉2での加熱処理中の酸素濃度の低下により製品Pから崩壊し難くなっている鋳砂をここで酸素濃度の高い新鮮な外気に接触させ、鋳砂の結合剤の酸化分解を早めてその崩壊・脱落を促進させることができるという効果がある。

したがって、製品Pに付着した鋳砂は鋳砂崩壊促進装置3を通過する際には殆ど崩壊し、次段の冷却装置4での揚砂ポンプ20等の負荷や水分と共に回収された鋳砂の回収再生の労力及び費用が著しく低減されるという利点がある。

また、鋳砂崩壊促進装置3を加熱炉2の搬出口側に配設したことにより、加熱炉2の排出口側の仕切ドア22の開放の際の低温の外気との直接接触による炉内温度の低下等の雰囲気の撹乱を著しく低減させる効果も得られる。

更に、前記の如き酸素濃度の高い雰囲気は単に新鮮な外気を導入することによって充分得られ、何ら特別な酸素供給源を必要としないし、この際の外気の加熱も鋳砂崩壊促進装置3内からの高温の排気との熱交換によって効果的に行うことができる。

更にまた、熱交換後の排気は排気ダクト16によって予熱炉1内に送給することにより予熱炉1の予熱源として利用することもでき、或いはまた冷却装置4の揚砂ポンプ20により回収された水分を含む鋳砂の乾燥に用いることもでき、装置全体としての熱利用を極めて効率的に行うことができる。

なお、上述の実施例においては加熱炉2自体の後部に仕切ドア22を付設してこれと搬出端部との間の帯域を鋳砂崩壊促進帯域として利用しているが、鋳砂崩壊促進装置3をそれ自体独立した帯域として加熱炉2と冷却装置4との間に設けることも勿論可能である。

また、加熱された製品Pは水槽17中で水により急冷されているが、冷媒としては水のほか必要に応じて通常の焼入油を用いることもできる。

また、実施例は複雑な構造物の鋳造に適しており、そのために鋳砂との離型性がしばしば問題となるアルミダイカストの熱処理の場合を特に好適な例として説明したが、本発明装置はこれに限らず、砂型を用いて鋳造される製品の熱処理であれば広く一般の鋳造物に適用して優れた効果を得ることができる。

以上述べたように、本発明によれば砂型鋳造製品の熱処理に際し、製品から鋳砂を容易に崩壊させることができるという優れた効果を有する。

4.図面の簡単な説明

第1図は本発明の一実施例の概要を示す平面図

第2図はその縦断面図、第3図は本発明実施例の要部を示す平面図、第4図はその縦断面図である。

符号の説明

1…予熱炉、2…加熱炉、3…鋳砂崩壊促進装置、4…冷却装置、5…ケーシング、6…バーナ、7…ターボファン、8…ファンモータ、10…スクリューコンベア、12…熱交換器、15…給気ダクト、P…アルミダイカスト製品。

特許出願人　トリニティ工業株式会社

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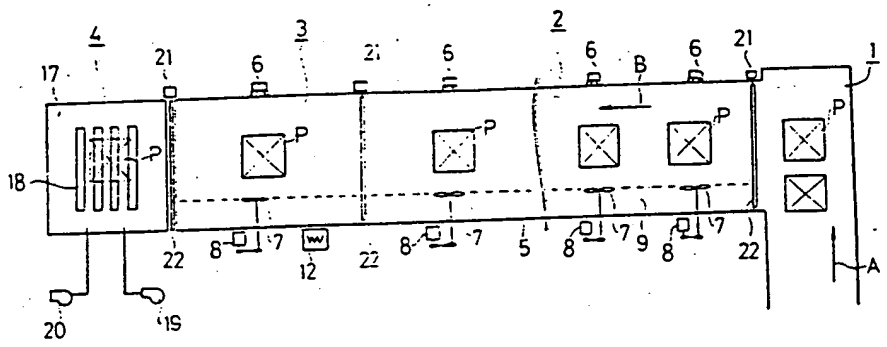
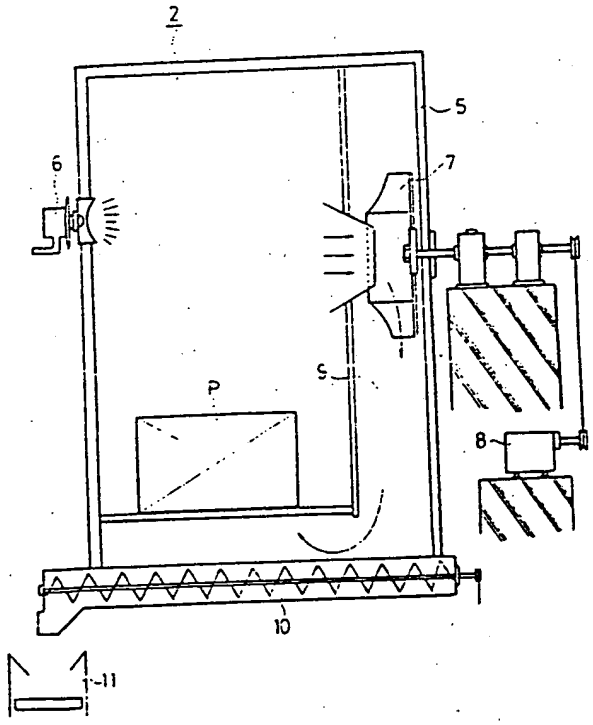
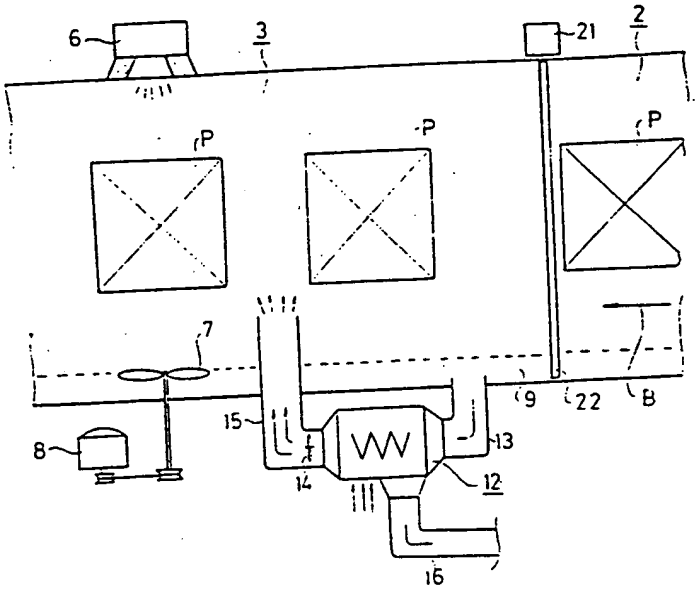
第 1 図



第 2 図



第3図



第4図